

Application Serial No.: 09/633,767

CLAIMS

WE CLAIM:

1. (currently amended) A method for alternative routing of a connection between a source node and a destination node in a PNNI hierarchical network, the method comprising responding to a failed connection between said nodes due to a sole-access element of the network structure as seen by the source node, where a said sole-access element is an element which provides sole access to the destination node in said network structure, by:

examining possible routes closest to the destination node;

selecting at least one non-sole-access element of the route used by the failed connection in said network structure;

identifying an alternative route for the connection in said network structure which does not utilize said at least one selected element; and

using the alternative route for establishment of the connection between said nodes.

2. (original) A method according to claim 1 including checking whether said alternative route satisfies a set of predefined connection constraints, wherein said alternative route is used for establishment of the connection only if said constraints are satisfied.

3. (original) A method according to claim 2 wherein said at least one element is a link of said network structure.

4. (original) A method according to claim 3 wherein the step of selecting comprises selecting all non-sole-access links of the route used by said failed connection which are outside the PNNI peer group of the source node.

Docket No.: CH919990018US1

-2-

Application Serial No.: 09/633,767

1 5. (original) A method according to claim 3 wherein the step of selecting comprises selecting
2 from the set of all non-sole-access links used by said failed connection which are outside the
3 PNNI peer group of the source node the link which is closest to a predetermined one of the
4 source and destination nodes.

5 6. (original) A method according to claim 5 including:

6 (a) if a successful connection is not established using the alternative route, selecting from
7 said set of non-sole-access links the next closest link to the predetermined node, identifying a
8 new alternative route for said connection which does not utilize said next closest link, and using
9 the new alternative route for establishment of the connection between said nodes; and

10 (b) repeating step (a) for the new alternative route until all links in said set have been
11 selected.

12 7. (original) A method according to claim 6 including checking whether an identified new
13 alternative route satisfies a set of predefined connection constraints, wherein the identified new
14 alternative route is used for establishment of the connection only if said constraints are satisfied.

15 8. (original) A method according to claim 6 wherein said new alternative route does not utilize
16 any link of said set between said predetermined node and said next closest link.

17 9. (canceled)

18 10. (original) A method according to claim 4 wherein, if a successful connection is not
19 established using said alternative route, the method includes:

20 (a) selecting from the set of all non-sole-access links used by said failed connection
21 which are outside the PNNI peer group of the source node the link which is closest to a
22 predetermined one of the source and destination nodes, identifying a new alternative route for the
23 connection which does not utilize said closest link, and using the new alternative route for
24 establishment of the connection between said nodes; and

Application Serial No.: 09/633,767

(b) if a successful connection is not established using the new alternative route, selecting from said set of non-sole-access links the next closest link to the predetermined node, identifying a new alternative route for said connection which does not utilize said next closest link and using the new alternative route so identified for establishment of the connection between said nodes; and

(c) repeating step (b) for the new alternative route so identified until all links in said set have been selected.

11. (original) A method according to claim 10 including checking whether an identified new alternative route satisfies a set of predefined connection constraints, wherein the identified new alternative route is used for establishment of the connection only if said constraints are satisfied.

12. (original) A method according to claim 10 wherein the new alternative route identified in step (b) does not utilize any link of said set between said predetermined node and said next closest link.

13. (canceled)

14. (currently amended) Apparatus for alternative routing of a connection between a source node and a destination node in a PNNI hierarchical network, the apparatus comprising:
memory for storing topology data, defining the network structure as seen by the source node, and route data indicative of the route in said network structure used for establishment of a connection between the source node and a destination node;
control logic configured to respond to a failed connection between said nodes due to a sole-access element of the network structure as seen by the source node, where a said sole-access element is an element which provides sole access to the destination node in said network structure, by:
examining possible routes closest to the destination node;
selecting at least one non-sole-access element of the route used by the failed connection in accordance with said route data;

Docket No.: CH919990018US1

-4-

Application Serial No.: 09/633,767

1 identifying from said topology data an alternative route for the connection which does not
2 utilize said at least one selected element; and
3 outputting the alternative route for establishment of the connection between said nodes.

4 15. (original) Apparatus according to claim 14 wherein the control logic is configured to check
5 whether the alternative route satisfies a set of predefined connection constraints, and to output
6 the alternative route for establishment of the connection only if said constraints are satisfied.

7 16. (original) Apparatus according to claim 15 wherein said at least one element is a link of said
8 network structure.

9 17. (original) Apparatus according to claim 16 wherein the control logic is configured to select
10 all non-sole-access links of the route used by said failed connection which are outside the PNNI
11 peer group of the source node when performing said selecting step.

12 18. (original) Apparatus according to claim 16 wherein the control logic is configured to select
13 from the set of all non-sole-access links used by the failed connection which are outside the
14 PNNI peer group of the source node the link which is closest to a predetermined one of the
15 source and destination nodes when performing said selecting step.

16 19. (original) Apparatus according to claim 18 wherein the control logic is configured such that:

17 (a) if a successful connection is not established using the alternative route, the control
18 logic selects from said set of non-sole-access links the next closest link to the predetermined
19 node, identifies a new alternative route for said connection which does not utilize said next
20 closest link, and outputs the new alternative route for establishment of the connection between
21 said nodes; and

22 (b) the control logic repeats step (a) for the new alternative route until all links in said set
23 have been selected.

Application Serial No.: 09/633,767

20. (original) Apparatus according to claim 19 wherein the control logic is configured to check whether an identified new alternative route satisfies a set of predefined connection constraints, and to output the identified new alternative route for establishment of the connection only if said constraints are satisfied.

21. (original) Apparatus according to claim 19 wherein the new alternative route does not utilize any link of said set between said predetermined node and said next closest link.

22. (canceled)

23. (original) Apparatus according to claim 17 wherein the control logic is configured such that, if a successful connection is not established using said alternative route:

(a) the control logic selects from the set of all non-sole-access links used by said failed connection which are outside the PNNI peer group of the source node the link which is closest to a predetermined one of the source and destination nodes, identifies a new alternative route for the connection which does not utilize said closest link, and outputs the new alternative route for establishment of the connection between said nodes; and

(b) if a successful connection is not established using the new alternative route, the control logic selects from said set of non-sole-access links the next closest link to the predetermined node, identifies a new alternative route for said connection which does not utilize said next closest link, and outputs the new alternative route so identified for establishment of the connection between said nodes; and

(c) the control logic repeats step (b) for the new alternative route so identified until all links in said set have been selected.

24. (original) Apparatus according to claim 23 wherein the control logic is configured to check whether an identified new alternative route satisfies a set of predefined connection constraints, and to output the identified new alternative route for establishment of the connection only if said constraints are satisfied.

Docket No.: CH919990018US1

-6-

Application Serial No.: 09/633,767

25. (original) Apparatus according to claim 23 wherein the new alternative route identified in step (b) does not utilize any link of said set between said predetermined node and said next closest link.

26. (canceled)

27. (currently amended) A source node of a PNNI hierarchical network, the source node having apparatus for alternative routing of a connection between that source node and a destination node in the network, said apparatus comprising:

memory for storing topology data, defining the network structure as seen by the source node, and route data indicative of the route in said network structure used for establishment of a connection between the source node and a destination node;

control logic configured to respond to a failed connection between said nodes due to a sole-access element of the network structure as seen by the source node, where a said sole-access element is an element which provides sole access to the destination node in said network structure, by:

examining possible routes closest to the destination node;

selecting at least one non-sole-access element of the route used by the failed connection in accordance with said route data;

identifying from said topology data an alternative route for the connection which does not utilize said at least one selected element; and

outputting the alternative route for establishment of the connection between said nodes.

28. (currently amended) A route server for association with a peer group of nodes in a PNNI hierarchical network, the route server comprising apparatus for alternative routing of a connection between a source node in said peer group and a destination node in the network, said apparatus comprising:

memory for storing topology data, defining the network structure as seen by the source node, and route data indicative of the route in said network structure used for establishment of a connection between the source node and a destination node;

Docket No.: CH919990018US1

-7-

Application Serial No.: 09/633,767

control logic configured to respond to a failed connection between said nodes due to a sole-access element of the network structure as seen by the source node, where a said sole-access element is an element which provides sole access to the destination node in said network structure, by:

examining possible routes closest to the destination node;

selecting at least one non-sole-access element of the route used by the failed connection in accordance with said route data;

identifying from said topology data an alternative route for the connection which does not utilize said at least one selected element; and

outputting the alternative route for establishment of the connection between said nodes.

29. (currently amended) A PNNI hierarchical network comprising apparatus for alternative routing of a connection between a source node and a destination node in said network, the apparatus comprising:

memory for storing topology data, defining the network structure as seen by the source node, and route data indicative of the route in said network structure used for establishment of a connection between the source node and a destination node;

control logic configured to respond to a failed connection between said nodes due to a sole-access element of the network structure as seen by the source node, where a said sole-access element is an element which provides sole access to the destination node in said network structure, by:

examining possible routes closest to the destination node;

selecting at least one non-sole-access element of the route used by the failed connection in accordance with said route data;

identifying from said topology data an alternative route for the connection which does not utilize said at least one selected element; and

outputting the alternative route for establishment of the connection between said nodes.

30. (original) An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing alternative routing of a connection

Application Serial No.: 09/633,767

1 between a source node and a destination node in a PNNI hierarchical network, the computer
2 readable program code means in said article of manufacture comprising computer readable
3 program code means for causing a computer to effect the steps of claim 1.

4 31. (original) A program storage device readable by machine, tangibly embodying a program of
5 instructions executable by the machine to perform method steps for causing alternative routing of
6 a connection between a source node and a destination node in a PNNI hierarchical network, said
7 method steps comprising the steps of claim 1.